MEAN LAKE LEVELS DURING JANUARY, 1915.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., Fe . 4, 1915.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during January, 1915:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sea level at New York	601.81	579.44	571.09	244.70
Above or below—				
Mean stage of December, 1914	−0.27	−0.18	−0.29	−0.13
Mean stage of January, 1914	−0.60	−0.63	−0.96	−0.90
Average stage for January, last 10 years	−0.22	−0.63	−0.72	−0.97
Highest recorded January stage	−0.97	−3.23	−2.46	−2.90
Lowest recorded January stage	+0.93	+0.36	+0.13	+0.90
Probable change during February, 1915	−0.2	0.0	−0.1	+0.1

THE WATER RESOURCES OF STRAWBERRY CREEK, BERKELEY, CAL.

By WILLIAM G. REED and HOWARD M. LOY.

[Dated: University of California, Dec. 17, 1914.]

Of the problems of immediate practical importance to the State of California at least two—that of frost and that of available water supply—are from their nature largely meteorological. In both these problems the importance of intensive studies of small areas is being recognized more and more as time goes on.

Because of the necessities of the university a study of the water resources of Strawberry Creek, which flows through the campus, has interested the university administration and the College of Civil Engineering. The wide variety of conditions in the drainage area of the creek, together with its small extent, about 1 square mile, also make it an interesting locality for the study of local rainfall variations and raingage exposure. As the flow of the stream is measured by a recording weir, the relation of rainfall to run-off may also be studied from this area. In view of these facts the problem of the water resources of Strawberry Canyon was undertaken as a senior thesis by by Mr. Loy, of the College of Civil Engineering of the University of California. Prof. Charles Gilman Hyde had the general direction of the thesis work, and the senior author of this paper assisted in the meteorological aspects of the study. The work done during the year 1913–14 by Mr. Loy is the beginning of a study which it is hoped may be carried on for several years. During the present winter the study is being made by Mr. M. K. White with additional raingages and in the light of the work done in 1913–14.

Topography.—The general topographic features of the drainage area and the positions of the raingages in service may be seen from the map (fig. 1) of this portion of the Berkeley Hills. The character of the soil and the geological structure of the region are such that practically all the water which falls on the drainage area either flows over the wier (*W* in fig. 1) or is evaporated from the drainage area. Strawberry Creek is a torrential stream, its main channel having a grade of about 400 feet to the mile. The drainage area of the creek above the wier is about 600 acres. The portion of the area north of the creek is larger than that south of the creek and the slopes are less steep. The entire area is, however, cut by ravines, so that rain water finds its way into the creek almost immediately. Strawberry Canyon is surrounded by a ridge, or spurs of ridges, varying in altitude from 1,200 to 1,500 feet above sea level. The elevation of Strawberry Creek at the wier is about 500 feet.

Sources.—In the study of the rainfall and run-off, data from the following sources were available:

(1) Rainfall amounts for the 12-hour periods ending at 8 a. m. and 8 p. m., 120th meridian time, on the university campus, from readings of an 8-inch gage 15 feet above the ground, but sheltered from wind by trees at some distance.

(2) Automatic records from a Friez tipping-bucket raingage on the university campus, 60 feet above the ground and not sheltered from the sweep of the wind.

(3) Rainfall amounts from five 8-inch gages exposed on the ground in the drainage area as indicated in figure 1.

(4) Stream-flow records from the recording weir located in the main channel of Strawberry Creek (*W* in fig. 1).

The rainfall records from both gages on the campus are in essential accord in spite of the difference in exposure conditions. The gages exposed on the drainage area were located with the intention of getting exposures at different altitudes more or less uniformly distributed over the area. The locations of the gages are shown by the figures on the accompanying map (fig. 1). Table 1 shows the essential conditions of the exposure of each of the five gages exposed on the drainage area. The position of the gages was somewhat influenced by the necessities of observation; they were so located that it was possible to make the round of the gages after each storm when the ground was in poor condition.

TABLE 1.—*Conditions of exposure of field raingages in Strawberry Canyon.*

Gage No.[1]	Altitude A. M. S. L.	Angle of slope.		Height of rim above ground.	Exposure.
		Above gage.	Below gage.		
	Feet.	°	°	*Inches.*	
1	520	4	28	20	Near creek bed. Well surrounded by vegetation. Near steep south side of canyon.
2	730	18	14	20	Similar to gage No. 1.
3	880	30	22	15	Ridge between two branches of creek. More exposed to wind than gages Nos. 1 and 2.
4	1,225	24	20	15	Shallow depression at head of small tributary.
5	1,270	12	22	15	Bare ridge. Exposed to sweep of the wind.

[1] These numbers correspond to those on the map, fig. 1.

The discharge of the stream is measured by a triangular weir, a form recognized as more accurate for a stream which varies widely, than a rectangular weir. The opening of the weir is V-shaped, with an angle of 90° at the bottom, the sides of the V are angle iron, so that the opening is sharp. The discharge is computed by Thompson's well-known formula

$$Q = 2.64\, h^{\frac{5}{2}}$$

where Q is the discharge in second-feet and h is the head in feet.

The recording device indicates simply the level of the water flowing over the weir. It consists of a pencil attached to a float working in a well beside the weir and recording with a scale of 1:1 on a sheet of paper wrapped around a wooden cylinder which is turned by clockwork at the rate of about ⅛ inch per hour, making a complete revolution in one week.

Results.—Perhaps the most important result of the study during the year was the recognition of the great difference in the catch of the gages. Probably this difference was due to exposure conditions. While it was, of course, recognized that the catch of the gage was dependent on the exposure, it was hoped that the results at the different gages might give an idea of the precipitation in the immediate vicinity of each gage. Table 2, which presents the records of the gages at the end of each storm,